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Thomas Duerbaum

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS DUERBAUM
and REINHOLD ELFERICH

Appeal 2009-008211
Application 10/797,791
Technology Center 2800

Before ROBERT E. NAPPI, KENNETH W. HAIRSTON,
and ELENI MANTIS MERCADER, *Administrative Patent Judges*.

HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appellants seek our review under 35 U.S.C. § 134(a) of the Examiner's final rejection of claims 5, 9, 11 to 13, 16 to 18, and 23 to 34. Claims 1 to 4, 6 to 8, 10, 14, 15, and 19 to 22 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Appellants' invention relates to a resonant converter (Figs. 1, 8, and 10) for use in power supplies of consumer electronics appliances such as set top boxes, TVs, computer monitors, compact audio systems, etc. (Spec. 1:3-11). Appellants' resonant converter can control overall output power generated by the converter by presetting the ratio of the magnitude of the output voltage to the number of turns on secondary windings which have different winding directions (Fig. 1; Abstract; Spec. 2:22-25). Appellants disclose and claim a resonant converter including a transformer with a primary winding and at least two secondary windings having different winding directions, and multiple outputs coupled to the secondary windings (claim 9). The resonant converter may also include capacitive and inductive elements, as well as an inverter (Figure 2), in series with the primary winding (Figs. 8 and 10; claim 5). The secondary windings may also be connected to the converter outputs via a diode and an output filter (Figs. 1, 8, and 10; claim 31). The resonant converter may also include a regulating circuit that receives the multiple outputs and outputs a measuring signal that regulates an output voltage (Figs. 1, 8, and 10; claim 31).

Claim 9 is representative of the claimed invention, and reads as follows:

9. A resonant converter comprising:

multiple outputs; and

a transformer with a primary winding and at least two secondary windings of different winding directions,

wherein different ratios of a magnitude of output voltage to number of turns are provided in respect of associated secondary windings having different winding directions.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Steigerwald	US 4,695,934	Sep. 22, 1987
Marson	US 5,077,486	Dec. 31, 1991
Liu	US 5,363,287	Nov. 8, 1994
Raets	US 5,777,859	Jul. 7, 1998
Duerbaum	US 6,721,191 B2	Apr. 13, 2004

(filed May 8, 2002)

(i) The Examiner rejected claims 9 and 16 under 35 U.S.C. § 102(b) based upon the teachings of Liu.

(ii) The Examiner rejected claims 5 and 31 under 35 U.S.C. § 103(a) based upon the teachings of Liu and Raets.

(iii) The Examiner rejected claims 11 to 13, 17, 18, 25 to 27, and 32 to 34 under 35 U.S.C. § 103(a) based upon the teachings of Liu and Raets, further in view of Steigerwald and Marson.

(iv) The Examiner rejected claims 23, 24, and 28 to 30 under 35 U.S.C. § 103(a) based upon the teachings of Liu, Steigerwald, and Marson.

(v) The Examiner rejected claims 5, 9, 11 to 13, 16 to 18, 23, and 24, based on the judicially created doctrine of non-statutory obviousness-type double patenting, over claims 1 to 19 of Duerbaum (USPN 6,721,191).

Anticipation

With regard to the anticipation rejection of claims 9 and 16, the Examiner relies upon Liu (Fig. 1; col. 6, ll. 10-30) as teaching the recited limitation of different ratios of “a magnitude of output voltage to number of turns” being provided with respect to the secondary windings having different winding directions (claim 9). The Examiner finds that Liu teaches different ratios for the top and middle transformer (Ans. 3). The Examiner states that “[t]he different ratio of output voltage (12, -12), to number of turns (turn are same for both (n), since voltage magnitude is the same (12)) is different since one ratio [is][sic] positive (12/n), [and][sic] the other is negative (-12/n)” (Ans. 3).

Appellants argue (App. Br. 4 and 6; Reply Br. 2 and 4-5) that the magnitude of -12 volts is the same as the magnitude of +12 volts, and Liu does not disclose a resonant converter having different ratios of a magnitude of output voltage to number of turns provided in respect of associated secondary windings having different winding directions. Appellants point out that “claim 9 does not recite ‘*different ratio of output voltage to number of turns*’” as asserted by the Examiner (Reply Br. 2 (emphasis in original)).

Based on Appellants’ arguments, the following anticipation issue is presented: Does Liu disclose a resonant converter “wherein different ratios of a magnitude of output voltage to number of turns are provided in respect of associated secondary windings having different winding directions,” as set forth in claims 9 and 16?

Obviousness

With regard to the obviousness rejections of (i) independent claims 5 and 31 over the combination of Liu of Raets, and (ii) dependent claims 11 to

13, 17, 18, 25 to 27 (which depend from claim 5) as well as dependent claims 32 to 34 (which depend from claim 31) over Liu, Raets, Steigerwald, and Marson, the Examiner relies on Liu (Fig. 1) as disclosing the recited features of a resonant converter and Raets (Fig. 1) as disclosing a capacitive element 8, inductive element 9, and electronic switches 6 and 7 (acting as an inverter) in series with a primary winding 10 of a converter (Ans. 4). The Examiner determines (Ans. 4) that since Liu's DC-AC-DC converter is equivalent to Raets' inverter, and these two topologies were recognized in the art at the time the invention was made, the ordinarily skilled artisan would have (i) found the substitution of an inverter for a converter obvious, and (ii) modified Liu's converter by utilizing Raets' technique.

As to claims 11 to 13, 17, 18, 25 to 27, and 32 to 34, the Examiner determines that it would have been obvious to modify the combination of Liu's resonant converter and Raets' inverter circuit with the techniques taught by Steigerwald and Marson "for the purpose of increasing the efficiency of the power supply, reducing cost and increasing reliability" (Ans. 6).

As to claims 23, 24, and 28 to 30, the Examiner also determines that it would have been obvious to modify Liu's power supply with the techniques taught by Steigerwald and Marson "for the purpose of increasing the efficiency of the power supply and to meet cost effectiveness and reliability" (Ans. 7).

With regard to claims 5, 11 to 13, 17, 18, and 25 to 27, Appellants contend (App. Br. 6-7; Reply Br. 5-6) that Raets' inverter circuitry and electronic switches would destroy Liu's resonant converter by increasing the EMI as described by Liu (*see* Liu at column 1, lines 8 to 67; Abstract), and

that the Examiner's determination that the topologies of Liu and Raets are equivalents is an unsupported conclusion. Appellants also contend (App. Br. 7-9; Reply Br. 7-9) that the Examiner fails to provide an adequate reason for combining Liu and Raets, and no articulated reasoning or rational underpinning exists for combining Steigerwald and Marson with Liu and Raets.

With regard to claims 31 to 33, Appellants contend (App. Br. 7-9; Reply Br. 7-9) that Liu and Raets do not disclose a regulating circuit for deriving from each of the multiple outputs of a resonant converter a measuring signal for regulating an output voltage. Appellants point out that the Examiner fails to even allege that Liu or Raets, or their combination, fails to disclose such a regulating circuit (App. Br. 7). Appellants also contend (App. Br. 7) that Raets' control circuit 20 does not have multiple outputs and thus cannot teach a similar technique to that recited in claim 31.

With regard to claim 34, Appellants argue (App. Br. 8-9; Reply Br. 9) that the Examiner fails to make a prima facie case of obviousness as to this claim because the Examiner has not addressed the half-bridge drive circuit which receives a signal from a regulating circuit to provide first and second control signals for switching first and second switching elements.

Based on Appellants' arguments, the following obviousness issues are presented:

- (i) Are Liu and Raets properly combinable such that together they disclose or suggest the resonant converter having capacitive and inductive elements and an inverter in series with the primary winding of the transformer, as set forth in claim 5?

- (ii) Do Liu and Raets, taken alone or in combination, disclose or suggest the regulating circuit for deriving a measuring signal for regulating an output voltage from multiple outputs, as set forth in claim 31?
- (iii) Do Liu and Raets, taken alone or in combination, disclose or suggest the half-bridge drive circuit, as set forth in claim 34?

FINDINGS OF FACT (FF)

1. Liu describes a resonant converter (Figs. 1 and 2) including a primary winding (shown on the left side of transformer T1) and at least two secondary windings having different winding direction (top two windings on the right side of transformer T1) and being electrically separated from each other. Liu's resonant converter includes multiple outputs coupled to the secondary windings (outputs to right of Fig. 1 having voltages of -12V and +12V). The outputs have the same output voltage magnitude, 12 volts (*see* Fig. 1).
2. Raets describes a voltage converter (Fig. 1) with two electronic switches 6 and 7 in series with a capacitance 8, an inductance 9, and a primary winding 10 of a transformer 11. The transformer 11 also has a secondary winding 12 with multiple output taps 16 and 17 providing output voltages V_1 and V_2 . A control circuit 20 "scans the voltage value decreasing across the capacitance 15 [V_{EHT}] and controls the switching frequency of the electronic switches 6 and 7 in such a way that the desired voltage value is maintained at all times" (col. 4, ll. 48-52). No connection is shown in Figure 1 between the output voltages V_1 and V_2 and control circuit 20.

PRINCIPLES OF LAW

Anticipation

Anticipation is established when a single prior art reference discloses, expressly or under the principles of inherency, each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994).

Obviousness

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). The Examiner's articulated reasoning in the rejection must possess a rational underpinning to support the legal conclusion of obviousness. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

ANALYSIS

Anticipation of Claims 9 and 16

Claim 9, and 16 by way of dependency on claim 9, recites a resonant converter “wherein different ratios of a magnitude of output voltage to number of turns are provided in respect of associated secondary windings having different winding directions.”

Liu discloses a resonant converter including multiple outputs (-12V and + 12V) coupled to the secondary windings where the outputs have the same output voltage magnitude of 12 volts (*see* Fig. 1; FF 1). Liu, however, is silent as to the number of turns provided with respect to each of the secondary windings having the different directions.

Appellants are correct that (i) the magnitude of -12 volts is the same as the magnitude of +12 volts (i.e., 12) (App. Br. 2), and (ii) “claim 9 does not recite ‘*different ratio of output voltage to number of turns*’” (Reply Br. 2 (emphasis in original)), thus the Examiner’s factual findings with regard to Liu’s ratio are flawed.

Appellants’ arguments (App. Br. 4 and 6; Reply Br. 2 and 4-5) that Liu does not disclose a resonant converter having different ratios of a magnitude of output voltage to number of turns provided in respect of associated secondary windings having different winding directions are convincing. Thus, with respect to the resonant converter recited in claims 9 and 16, Liu fails to disclose at least two secondary windings of different winding directions that also have “different ratios of a magnitude of output voltage to number of turns” as recited in claim 9. It follows that the Examiner has not established anticipation because Liu does not disclose each and every limitation of the claimed invention set forth in claims 9 and 16. *Atlas Powder Co.*, 190 F.3d at 1347; *Paulsen*, 30 F.3d at 1478-79.

Accordingly, we will not sustain the anticipation rejection of claims 9 and 16.

Obviousness of Claims 23, 24, and 28 to 30

Turning next to the obviousness rejection of claims 23, 24, and 28 to 30, the Examiner’s determination that it would have been obvious to modify Liu’s power supply with the techniques taught by Steigerwald and Marson “for the purpose of increasing the efficiency of the power supply and to meet cost effectiveness and reliability” is reasonable (*see* Ans. 7). Nonetheless, claims 23, 24, and 28 to 30 depend from claim 9 discussed *supra* with respect to the anticipation rejection.

In light of our findings with respect to Liu (FF 1), and for similar reasons discussed above with respect to the anticipation rejection of claim 9, we find that the Examiner has not established a sufficient factual basis to support the legal conclusion of obviousness as to claims 23, 24, and 28 to 30 which depend from claim 9 (*see Fine*, 837 F.2d at 1073). In view of the foregoing, we will not sustain the obviousness rejection of claims 23, 24, and 28 to 30.

Obviousness of Claims 5, 11 to 13, 17, 18, and 25 to 27

Turning next to the obviousness rejections of claims 5, 11 to 13, 17, 18, and 25 to 27, we are not persuaded by Appellants' contention (App. Br. 6-7; Reply Br. 5-6) that Raets' inverter circuitry and electronic switches would destroy Liu's resonant converter by increasing EMI as described by Liu (*see* Liu at column 1, lines 8 to 67; Abstract), and that the Examiner's determination that the topologies of Liu and Raets are equivalents is an unsupported conclusion.

Appellants present no evidence that the topologies of Liu and Raets are not equivalent, and have not otherwise rebutted the Examiner's determination that such equivalents could be substituted on the front end of a resonant converter such as that shown in Figure 1 of Liu.

One of ordinary skill in the art of circuitry design would have no problem substituting the inverter of Raets in the resonant converter circuit of Liu with known methods, and the voltage stabilization circuits 18 and 19, along with control circuit 20 for regulating switches 6 and 7, may prevent at least some interference caused by switches 6 and 7. Additionally, Raets describes a "preconditioner (not shown) which reduces the higher harmonics of the mains current consumption, may be arranged between the rectifier

bridge and the capacitance 5” (column 3, lines 40-43), and a capacitance 5 which functions to stabilize the output voltage of the rectifier bridge composed of four diodes 1 through 4 (column 3, lines 36 to 40). Therefore, we do not find Appellants’ assertion (App. Br. 6-7; Reply Br. 5-6) that Raets’ circuitry being put into the front end of Liu’s resonant converter would destroy Liu by the introduction of too much EMI persuasive.

Appellants’ contentions (App. Br. 7-9; Reply Br. 7-9) that there is no adequate reason for combining Liu and Raets, and no articulated reasoning or rational underpinning exists for combining Steigerwald and Marson with Liu and Raets, are also unconvincing. The Examiner’s articulated reasoning in the rejections (*see* Ans. 4-5) possesses a rational underpinning to support the legal conclusion of obviousness. *Kahn*, 441 F.3d at 988.

In view of the foregoing, as well as our findings as to Liu (FF 1) and Raets (FF 2), Liu and Raets are properly combinable and together they disclose or suggest the resonant converter having capacitive and inductive elements and an inverter in series with the primary winding of the transformer, as set forth in claim 5. Furthermore, the Examiner’s modification of the combination of Liu and Raets with Steigerwald and Marson is reasonable.

Accordingly, we will sustain the Examiners obviousness rejections of (i) independent claim 5 over the combination of Liu of Raets, and (ii) dependent claims 11 to 13, 17, 18, 25 to 27 (which depend from claim 5) over Liu, Raets, Steigerwald, and Marson.

Obviousness of Claims 31 to 33

Turning next to the obviousness rejections of claims 31 to 33, we find Appellants' argument (App. Br. 7-9; Reply Br. 7-9) that Liu and Raets do not disclose a regulating circuit as set forth in claim 31 persuasive. Neither Liu nor Raets disclose a regulating circuit for deriving from each of the multiple outputs of a resonant converter a measuring signal for regulating an output voltage (*see* FF 1 and FF 2, respectively). Thus, we agree with Appellants (App. Br. 7) that Raets' control circuit 20 does not have multiple outputs and thus cannot teach a similar technique to that recited in claim 31.

In addition, Appellants are correct (App. Br. 7) that the Examiner fails to even allege that Liu or Raets, or their combination, disclose such a regulating circuit (*see generally* Ans. 4). The Examiner has not established a sufficient factual basis to support the legal conclusion of obviousness as to claim 31 (*see Fine*, 837 F.2d at 1073), and thus the Examiner's articulated reasoning in the rejection does not possess a rational underpinning to support the legal conclusion of obviousness as to claim 31, and as to claims 32 and 33 which depend therefrom. *Kahn*, 441 F.3d at 988.

In view of the foregoing, we will not sustain the Examiner's obviousness rejections of claims 31 to 33.

Obviousness of Claim 34

Turning next to the obviousness rejection of claim 34, we agree with Appellants (App. Br. 8-9; Reply Br. 9) that the Examiner has not made a *prima facie* case of obviousness as to this claim because the Examiner has not addressed the recited limitation of a half-bridge drive circuit which receives a signal from a regulating circuit to provide first and second control signals for switching first and second switching elements (*see generally* Ans.

5). Liu and Raets, taken alone or in combination, do not disclose or suggest the half-bridge drive circuit and regulating circuit, as set forth in claim 34 (*see* FF 1 and FF 2).

In view of the foregoing, we will not sustain the Examiner's obviousness rejection of claim 34.

Non-Statutory Obviousness-Type Double Patenting Rejection

Based on Appellants' failure to address the Examiner's *prima facie* case of non-statutory obviousness-type double patenting, Appellants have failed to show that the Examiner erred in determining that claims 1 to 19 of Duerbaum teach or suggest the resonant converter as recited in claims 5, 9, 11 to 13, 16 to 18, and 23 to 34. Accordingly, we will sustain the Examiner's non-statutory obviousness-type double patenting rejection of these claims *pro forma*. *See* 37 C.F.R. § 41.37(c)(1)(vii) (requiring a statement in the briefs as to each ground of rejection presented by Appellants for review); 37 C.F.R. § 41.37(c)(1)(vii) (stating that arguments not presented in the briefs by Appellants will be refused consideration).

ORDER

The Examiner's decisions rejecting (i) claims 9 and 16 under 35 U.S.C. § 102(b) as anticipated by the teachings of Liu, and (ii) claims 23, 24, and 28 to 34 under 35 U.S.C. § 103(a) as being obvious over the various combinations of Liu, Raets, Steigerwald, and/or Marson are reversed.

The Examiner's decisions rejecting (i) claims 5, 11 to 13, 17, 18, and 25 to 27 under 35 U.S.C. § 103(a) as being obvious over the various combinations of Liu, Raets, Steigerwald, and/or Marson, and (ii) claims 5, 9, 11 to 13, 16 to 18, and 23 to 34 over claims 1 to 19 of Duerbaum based on

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the judicially created doctrine of non-statutory obviousness-type double patenting are affirmed.

Accordingly, the decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

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